

REMARKS

INTRODUCTION

In accordance with the foregoing, claims 1 and 8 have been amended. Claims 1-10 are pending and under consideration.

CLAIM REJECTIONS

Claims 1-10 were rejected under 35 USC 103(a) as being unpatentable over "VLSI Architecture for Block-Matching Motion Estimation Algorithm," Chaur-Heh Hsieh and Ting-Pang Lin, IEEE Transaction on circuits and Systems for Video Technology, Vol. 2, No. 2, June 1992, pages 169-175 (hereinafter "Hsieh") in view of Yamauchi (US 6,072,833) (hereinafter "Yamauchi").

Amended claim 1 recites: "...an offset control part which determines vertical reference positions for the second frame to be the positions of the second frame which is shifted according to the vertical motion vector, when calculating horizontal motion vectors of the second frame; and a horizontal motion vector calculation part which calculates the horizontal motion vectors of the second frame from lines corresponding to the decided vertical reference positions."

Amended claim 8 recites: "...determining vertical reference positions for the second frame to be the positions of the second frame which is shifted according to the vertical motion vector, when calculating horizontal motion vectors of the second frame; and calculating the horizontal motion vectors of the second frame from lines according to the determined vertical reference positions."

In contrast to Hsieh and Yamauchi, the present invention as recited in claims 1 and 8 calculates vertical motion vectors of a second frame, that is, the current frame, with reference to a first frame, that is, the previous frame, and shifts a comparative object of the second frame according to the calculated vertical motion vectors to positions in which horizontal motion vectors are obtained. In the rejection of claims 1 and 8, the Examiner relies on Figures 4 and 8, and column 6, lines 20-22, of Yamauchi, which discuss that the H-SEL (3x) and H-DET (6x) calculate the V_x using the signals (S1, S2) inputted by a first field and a second field. The H-SEL (3y) and H-DET (6y) calculate the V_y using the signals (S1, S3) inputted by a first field and a third field. The S1 indicates a luminance signal of the current field; S2 indicates a luminance signal of the previous field; and S3 indicates a luminance signal inputted into the field ahead of the previous field.

The present invention as recited in claims 1 and 8 is distinct from Yamauchi in that first, claims 1 and 8 calculate vertical motion vectors by **comparing a current frame and a previous frame** while Yamauchi calculates prospective initial vectors (V_y) by **comparing a current field (S1) and a previous field (S3)**, and second, claims 1 and 8 **shift a second frame as far as vertical motion vectors** and calculates horizontal motion vectors while Yamauchi **shifts coordinates of a block as far as vertical motion vectors and horizontal motion vectors**.

Claims 2-7, 9 and 10 depend on one of claims 1 or 8, respectively, and are therefore believed to be allowable for at least the foregoing reasons. Further claims 2-7, 9 and 10 recite features that patentably distinguish over Hsieh and Yamauchi, taken alone or in combination. For example, claim 2 recites that the vertical motion vector calculation part comprises a vertical pixel value storage which adds values of pixels of each of horizontal lines forming the first frame to calculate vertical sums, and stores the vertical sums by horizontal line; and a first SAD value calculator which calculates differences between the vertical sums of the first frame and vertical sums of the second frame calculated by adding values of pixels of each of horizontal lines forming the second frame, and processes the differences into absolute values to calculate sums of absolute difference (SAD) values. In contrast to claim 2, Hsieh discusses that the shift register (SR) stores pixel values corresponding to a search area of a size described in Figure 7 and Col. C as opposed to the Examiner's objection that a shift register (SR) stores each pixel value. The vertical pixel value storage of claim 2 stores in each horizontal line the vertical sums calculated by adding pixel values of that horizontal line, and the horizontal pixel value storage of the present invention stores in each vertical line the horizontal sums calculated by adding pixel values of that vertical line. Therefore, the shift register (SR) of Hsieh and the storages of the claim 2 store different values.

Withdrawal of the foregoing rejections is requested.

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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